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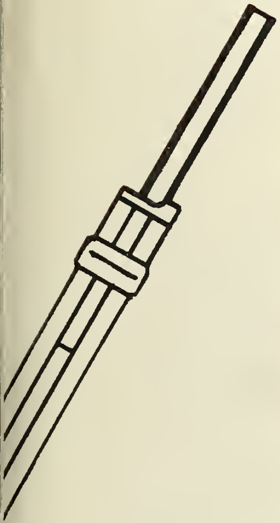
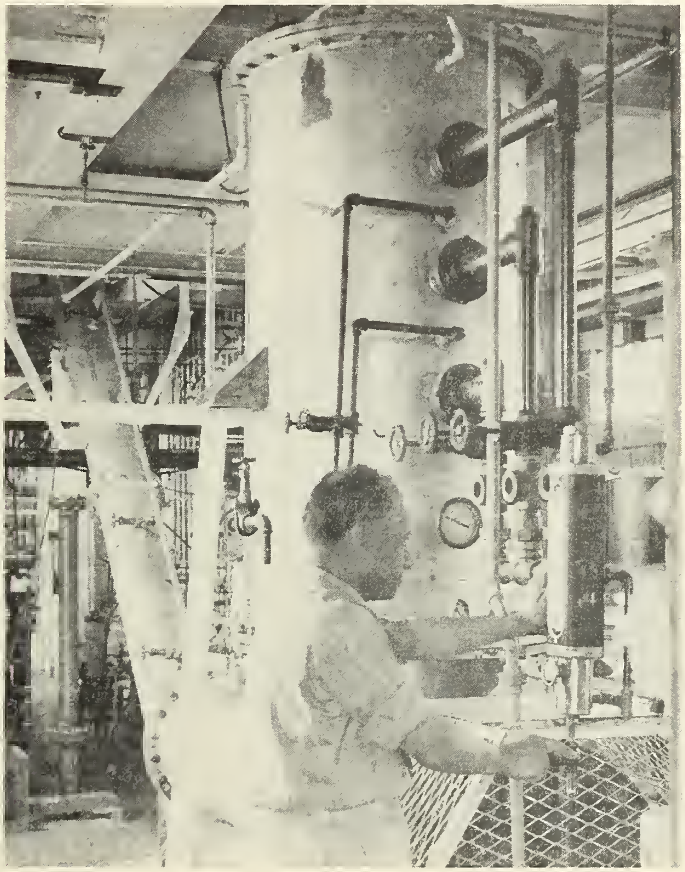
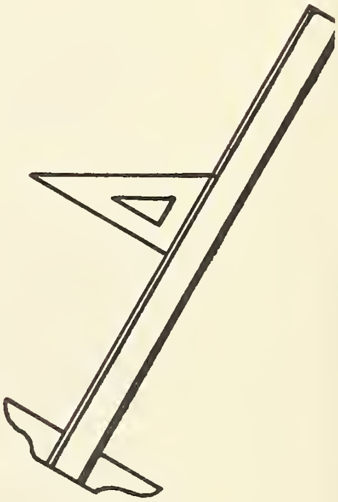
By Kenneth M. Decossas, Frederick A. Deckbar, Jr.,
and Joseph L. Hecker
Engineering and Development Division







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DENSITIES AND GRAVITIES OF COTTONSEED AND PEANUT OIL-HEXANE MISCELLAS IN ENGLISH UNITS

by
Kenneth M. Decossas, Frederick A. Deckbar, Jr., and Joseph L. Hecker
Southern Regional Research Laboratory

INTRODUCTION

Data previously published (1) in metric units on density-temperature-composition relationships for refined and winterized cottonseed oil-commercial hexane miscellas and refined and winterized peanut oil-commercial hexane miscellas are replotted in English Units (2). Densities are replotted both in pounds per cubic foot, ρ, and in pounds per gallon, and temperatures, t, in degrees Fahrenheit. The specific gravities are calculated on a basis of the density of water at 60° F. These plots complement those previously published (3) in English units on boiling points of cottonseed and peanut oil miscellas. Because design and operation engineers generally work with English units, the purpose of replotting is to render these data more useful and suitable for design calculations, plant operations, and interpretations of operating data.

The ranges of densities, temperatures, and compositions are the same as used for the experimental work (1) and are applicable to operating conditions in current industrial vegetable oil solvent-extraction technology and to the design of equipment used in solvent-extraction and solvent-crystallization processes. Also being prepared in English units, to further complement this work, are viscosity-temperature-composition relationships.

In converting tables of densities of the vegetable oil miscellas at various temperatures and compositions (1) into the new units, the data were first plotted as intermediate density-composition isotherms. The units of density for these curves were pounds per cubic foot. Values of density versus temperature were taken off the intermediate curves at constant compositions, and readings were used to plot figures 1 through 6.

DESCRIPTION OF DENSITY AND SPECIFIC GRAVITY CHARTS

Figures 1 and 2 are plots of the readings taken from the intermediate curves with the ordinate in pounds per cubic foot. In Figures 3 and 4 the readings are expressed with the ordinate in pounds per gallon. The specific gravity-temperature constant composition curves shown in Figures 5 and 6, were plotted from the original readings, with the specific gravity as the ordinate. The temperature is plotted along the abscissa in degrees Fahrenheit.

CHARACTERISTICS OF THE ORIGINAL OILS AND SOLVENTS

The cottonseed oil used to obtain the original data (1) was refined, bleached, and winterized, and had a Wijs iodine number of 110.6 and a free fatty acid content of 0.11%. It was winterized in admixture with a commercial hexane at -17° C. using a solvent-oil ratio of 1 to 1 by weight.

The peanut oil was refined, and winterized in admixture with the commercial hexane at -20° C. using a solvent-oil ratio of 3 to 1 by weight. It had a Wijs iodine value of 92.6 and a free fatty acid content of 0.41%. The commercial hexane was used as received without further treatment.

ACKNOWLEDGMENT

The general supervision of E. A. Gastrock, Head, Engineering and Development Division, is acknowledged. The recalculation of data and plotting of curves were performed under the direction of Henri J. Molaison, In Charge of Design Groups of the Division's Process Costs and Design Section.

REFERENCE

(1) Magne, F. C., and Skau, E. L. Viscosities and Densities of Solvent Vegetable Oil Mixtures. Industrial and Engineering Chemistry, Vol. 37, Page 1097, November, 1945.

(2) Symbols and Nomenclature of Chemical Engineering. American Institute of Chemical Engineers Transactions, Vol. 40, No. 2, page 254, April 25, 1944.

(3) Decossas, K. M., Mackey, H. A., and Heughan, G. P. Boiling Points of Cottonseed and Peanut Oil Miscellas in English Units, U. S. Department of Agriculture, Agricultural Research Administration, Bureau of Agricultural and Industrial Chemistry, AIC 257.

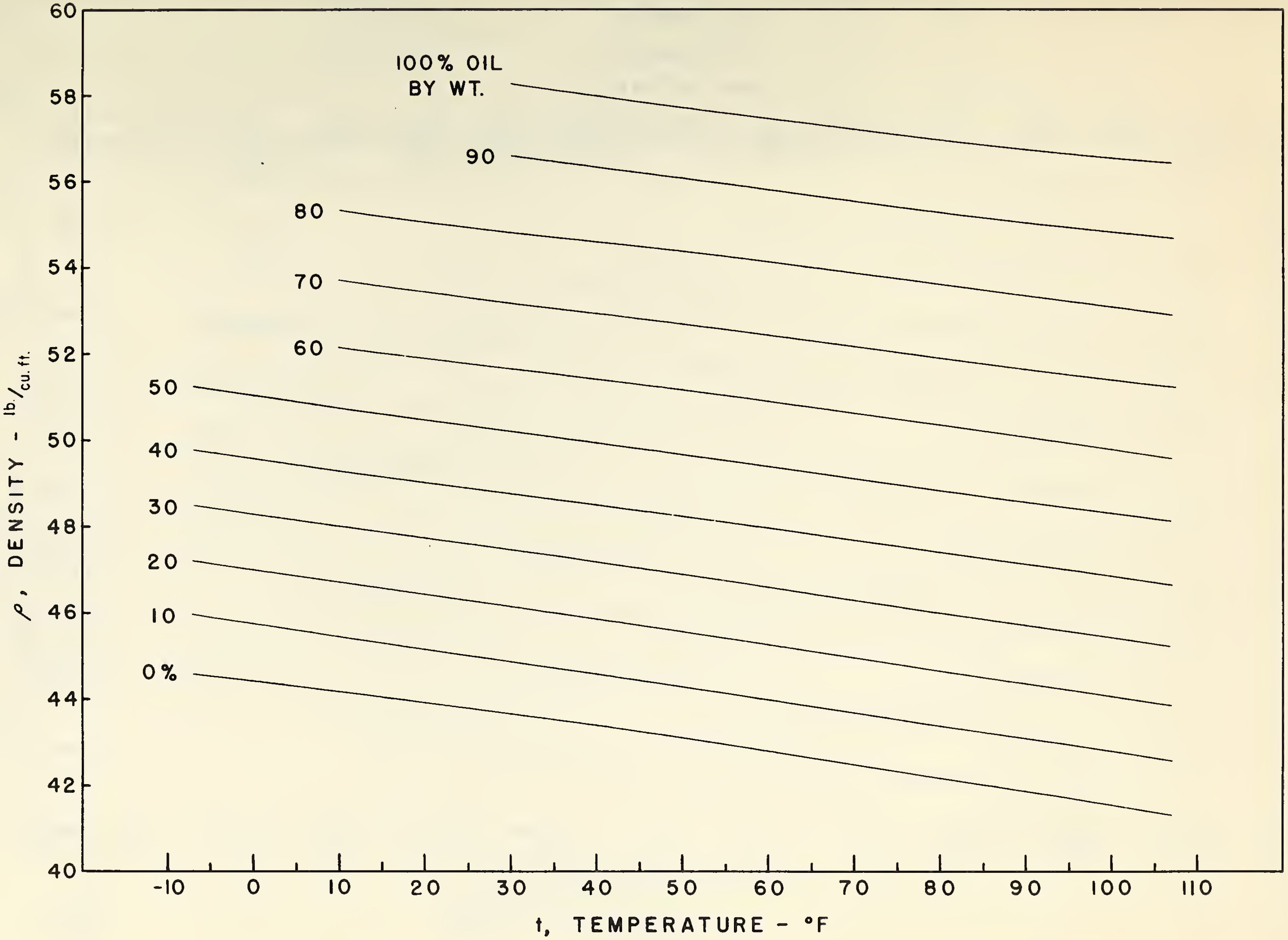

FIGURE I

DENSITIES

COTTONSEED OIL - COMMERCIAL HEXANE MISCELLAS

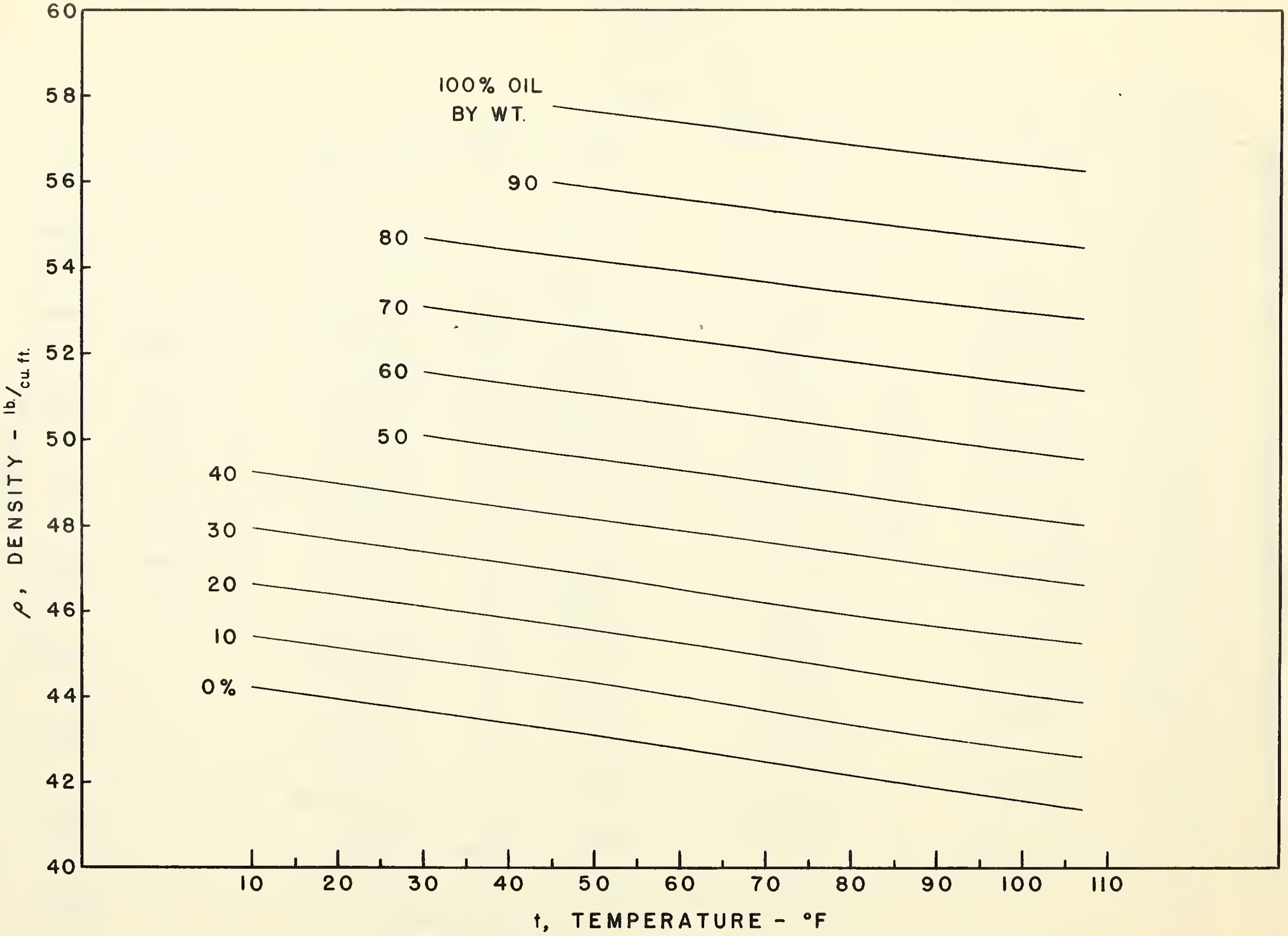

FIGURE 2
DENSITIES
PEANUT OIL - COMMERCIAL HEXANE MISCELLAS

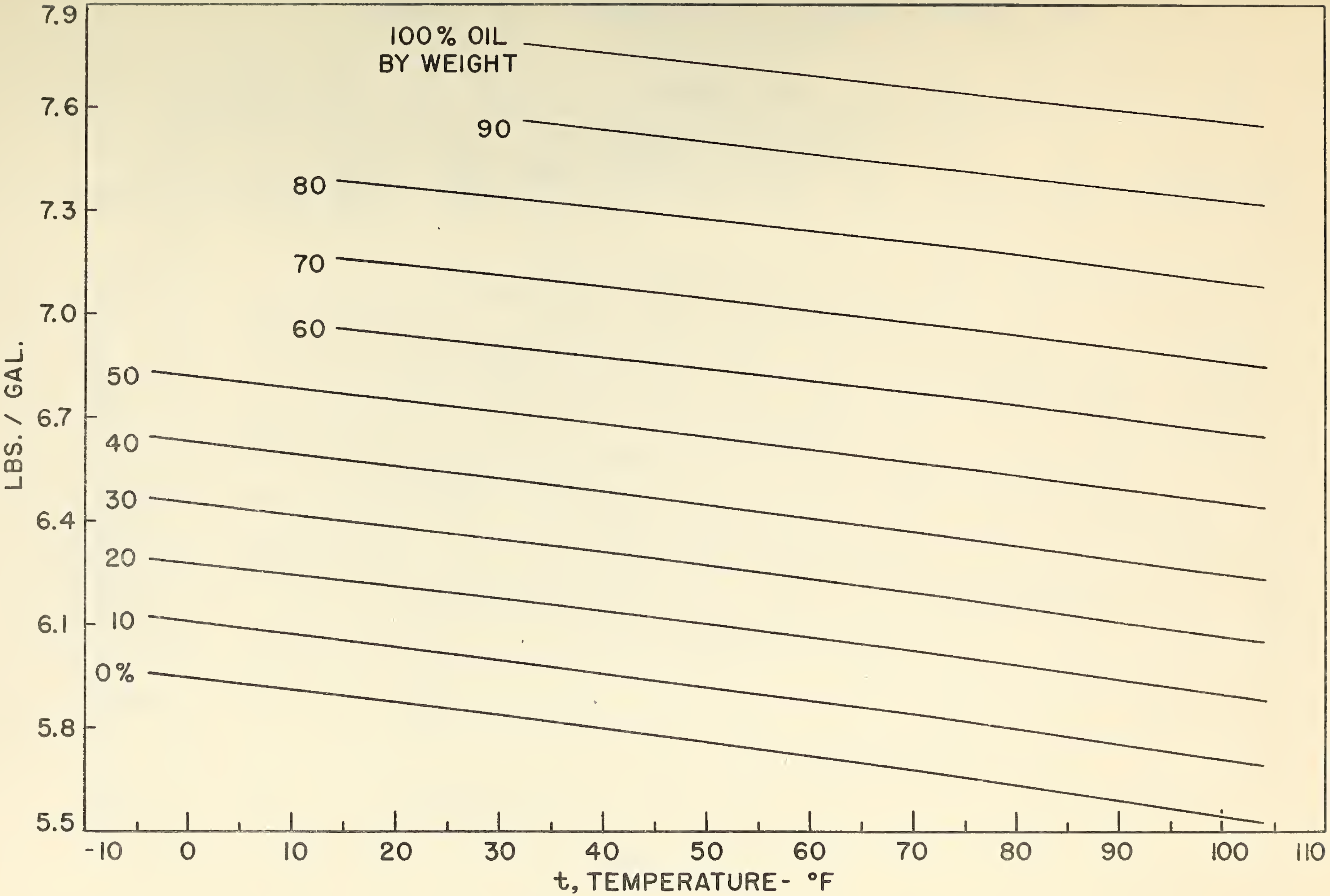

FIGURE 3

DENSITIES

COTTONSEED OIL-COMMERCIAL HEXANE MISCELLAS

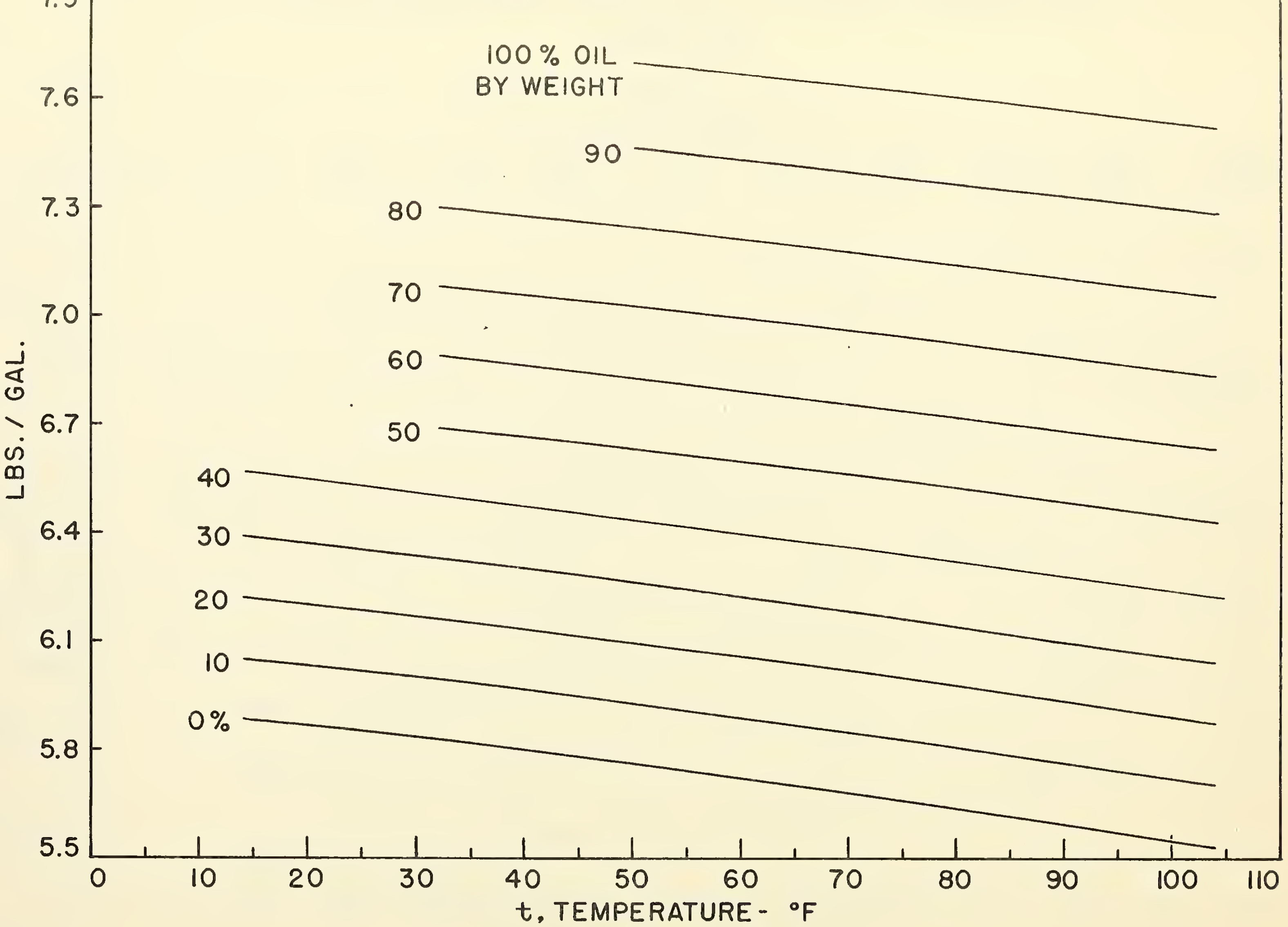

FIGURE 4
DENSITIES
PEANUT OIL - COMMERCIAL HEXANE MISCELLAS

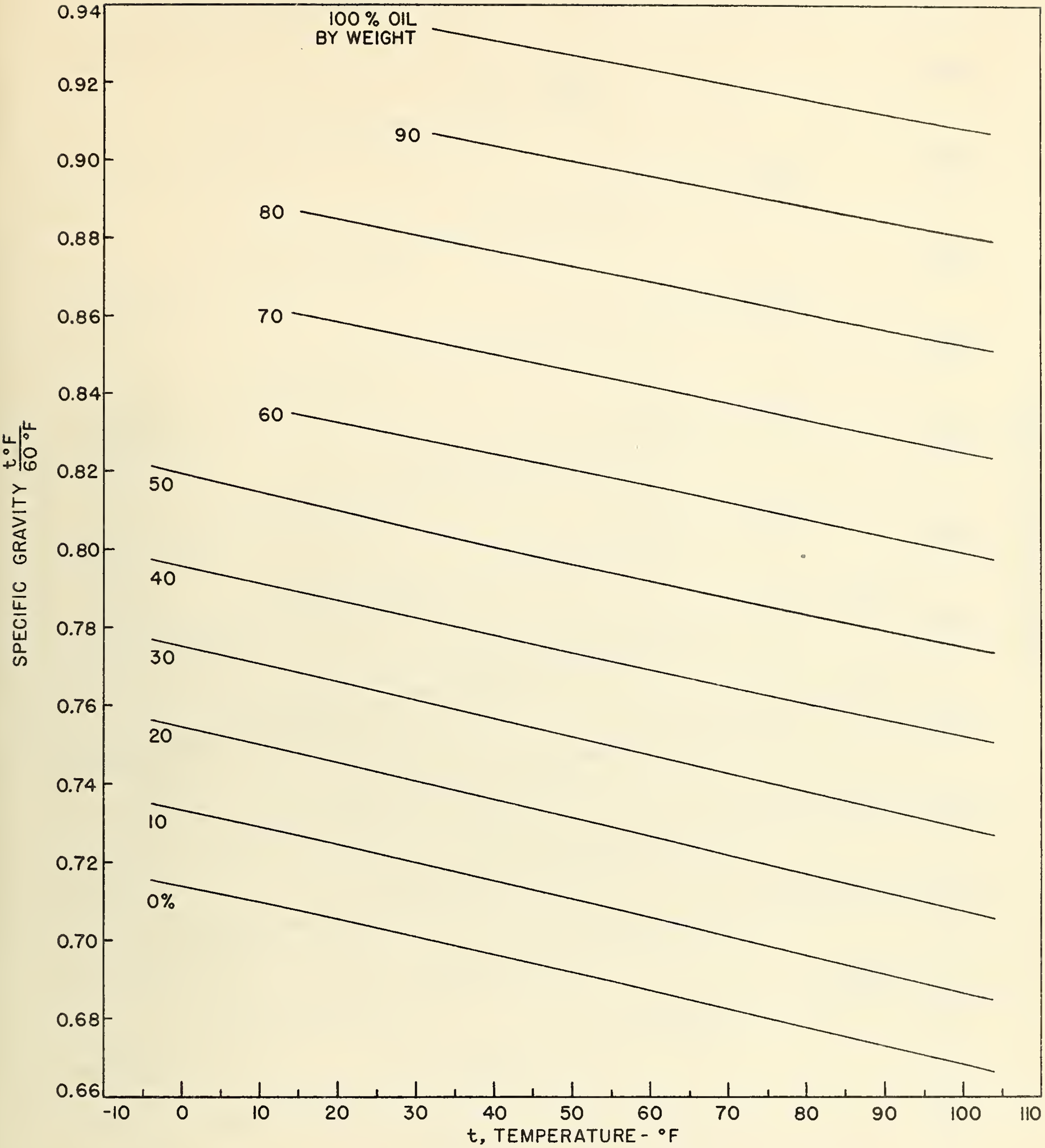

FIG. 5 SPECIFIC GRAVITIES
COTTONSEED OIL- COMMERCIAL HEXANE MIXTURES

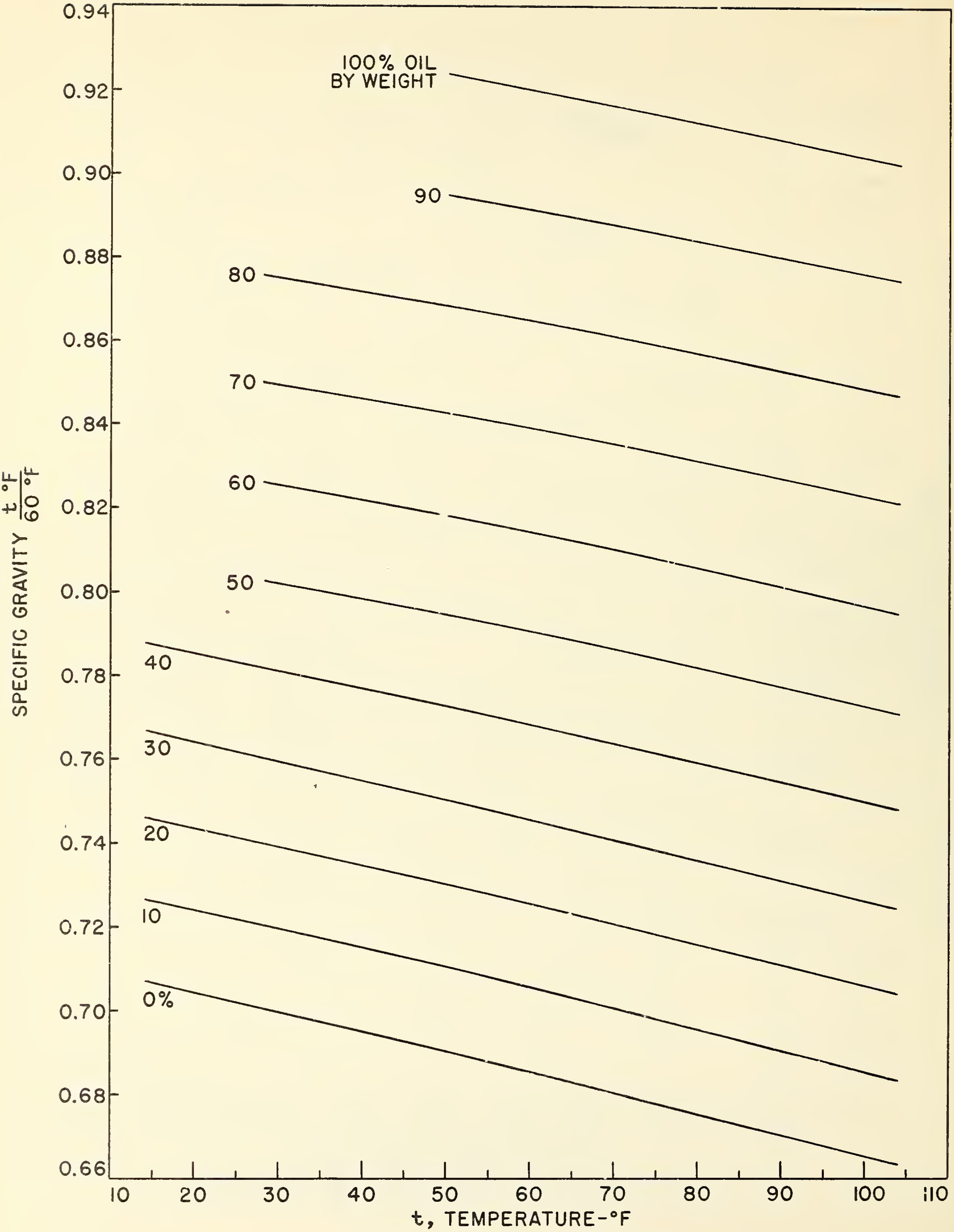

FIG. 6 SPECIFIC GRAVITIES
PEANUT OIL- COMMERCIAL HEXANE MIXTURES